



SAULT STE. MARIE

water pollution control plant

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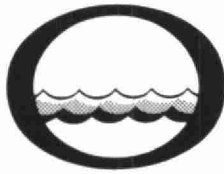
Division of Plant Operations

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Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario

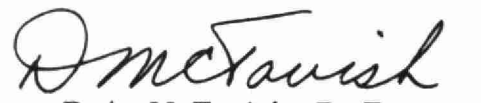
We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.


D. S. Caverly,
General Manager.


D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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SAULT STE. MARIE
water pollution control plant

operated for

THE CITY OF SAULT STE. MARIE

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

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'68 REVIEW

The average daily flow for the year was 8.70 million gallons per day, 8.75% over the hydraulic plant capacity. The total plant flow in 1968 was 3196.1 million gallons which is an increase of 14% over 1967 flows. This increase was due in part to high rainfalls in the summer and to high spring and fall flows. The flow exceeded the plant hydraulic capacity 67% of the time. However, the average strength of the raw sewage was quite low.

The total annual flow for 1968 was 3196.10 million gallons at a total expense of \$136,641.46 or \$42.80 per million gallons treated.

The cost of chemicals has decreased by about \$3,000 from 1967. During 1968, only polyelectrolytes were used as conditioning agents for the vacuum filtration of raw sludge. The cost of filtering was thus reduced to \$2.67 per dry ton.

As in 1967 a considerable number of man-hours were spent at the Pim Street and Clark Creek sewage pumping stations.

Grease from an industrial source caused frequent blockage of sludge lines. Clearing these lines continued to be a time-consuming and costly nuisance.

The plant is attended 16 hours per day, seven days per week by a superintendent and a staff of nine men.

There were routine inspections by the operations engineer and his assistant, the maintenance section, the special services section and the safety officer.

PROJECT COSTS

NET CAPITAL COST (Final)		<u>\$3,244,149.35</u>
DEDUCT - Payments from Municipalities	\$ 2,900.00	
- Portion Financed by CMHC-MDLB (Final)	<u>2,145,572.61</u>	<u>2,148,472.61</u>
Long Term Debt to OWRC		<u>\$1,095,676.74</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968		\$ <u>189,872.03</u>
Net Operating		\$ 136,641.46
Debt Retirement		22,111.00
Reserve		17,624.59
Interest Charged		<u>61,515.01</u>
TOTAL		\$ <u>237,892.06</u>

RESERVE ACCOUNT

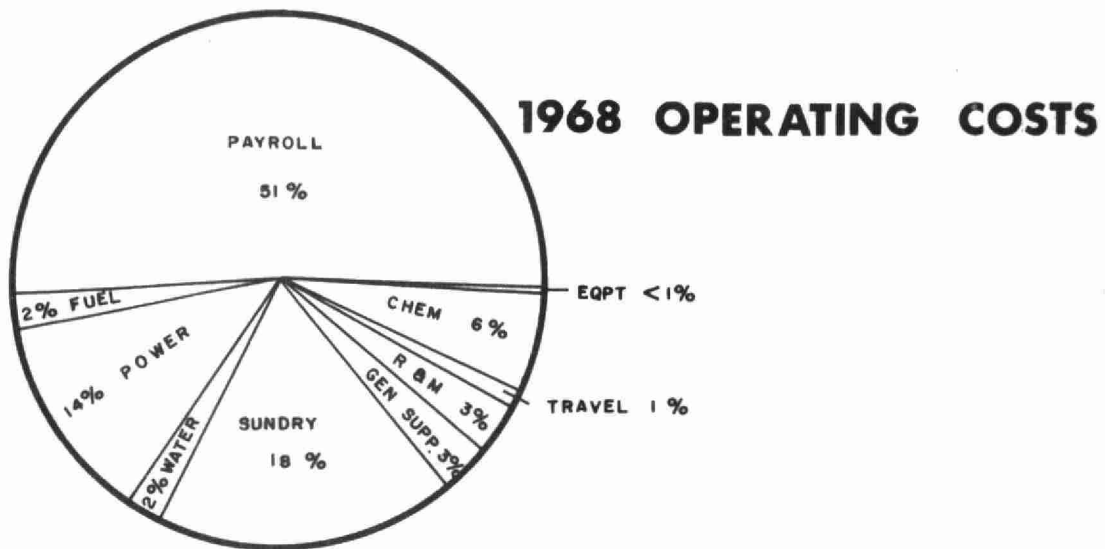
Balance at January 1, 1968	\$ 118,912.55
Deposited by Municipality	17,624.59
Interest Earned	7,397.40
	<hr/>
	\$ 143,934.54
Less Expenditures	<u>471.89</u>
Balance at December 31, 1968	\$ <u>143,462.65</u>

Monthly Operating Costs

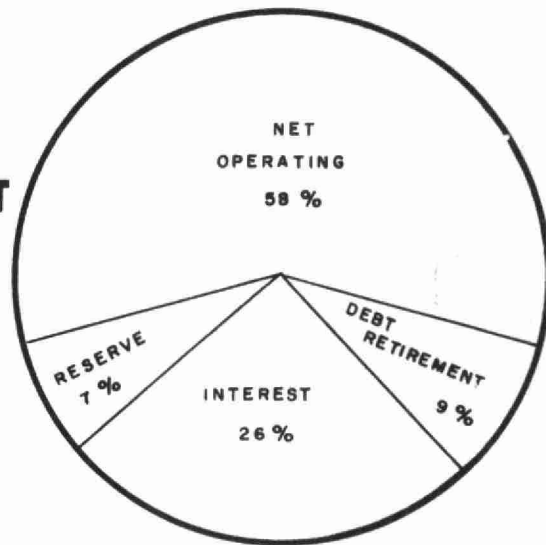
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAY ROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	8765.42	4615.43	491.56	506.60	2349.67	967.84	203.72	-	-	97.91	39.29	-
FEB	7432.52	4523.50	410.12	581.10	665.82	-	171.27	-	99.50	928.00	127.71	-
MAR	12885.51	7829.02	-	238.40	2470.54	-	126.37	-	385.00	1311.03	164.60	17.85
APRIL	8098.40	5131.40	127.85	69.26	726.01	-	332.51	-	765.89	657.60	118.74	-
MAY	6853.09	4925.99	54.56	183.50	1177.27	-	96.20	-	84.42	330.87	114.52	-
JUNE	23168.39	4711.70	324.92	-	2383.09	1669.49	781.26	-	263.75	12477.20	261.48	112.00
JULY	7373.15	4808.84	301.51	-	-	308.70	294.78	-	185.00	1073.31	228.46	172.55
AUG	11603.50	7388.11	78.62	-	2332.70	-	361.55	126.83	24.27	937.60	353.82	-
SEPT	6550.37	5237.30	-	99.33	902.81	-	207.51	-	(3.00)	50.42	-	56.00
OCT	13830.33	5098.37	-	286.91	2864.65	2217.86	477.62	-	26.16	2174.12	684.64	-
NOV	15113.00	4908.10	-	135.78	2400.36	2370.11	407.82	-	1400.24	2863.04	429.75	197.80
DEC	14967.78	9378.03	-	565.75	758.48	-	502.39	163.05	959.36	2160.06	307.81	172.85
TOTAL	136641.46	68555.79	1789.14	2666.63	19031.40	7534.00	3963.00	289.88	4190.59	25061.16	2830.82	729.05

*SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$10,984.00

BRACKETS INDICATE CREDIT



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	2432.62	\$112,623.50	\$46.29	12 cents
1965	2831.10	122,349.41	43.22	7 cents
1966	2668.91	126,102.15	47.25	11 cents
1967	2796.57	135,741.58	48.54	17 cents
1968	3196.10	136,641.46	42.75	14 cents

Process Data

The Sault Ste. Marie plant is a primary sewage treatment plant. There is no digester. The sludge is thickened in an aerated sludge thickening tank and is then filtered.

The effluent was chlorinated from May to November inclusively at an average dosage of 5.4 mg/l.

The flows averaged 8.7 mgd and ranged from 19.54 mgd to 6.05 mgd, exceeding the plant capacity of 8.0 mgd, 67% of the time.

PLANT FLOWS and CHLORINATION

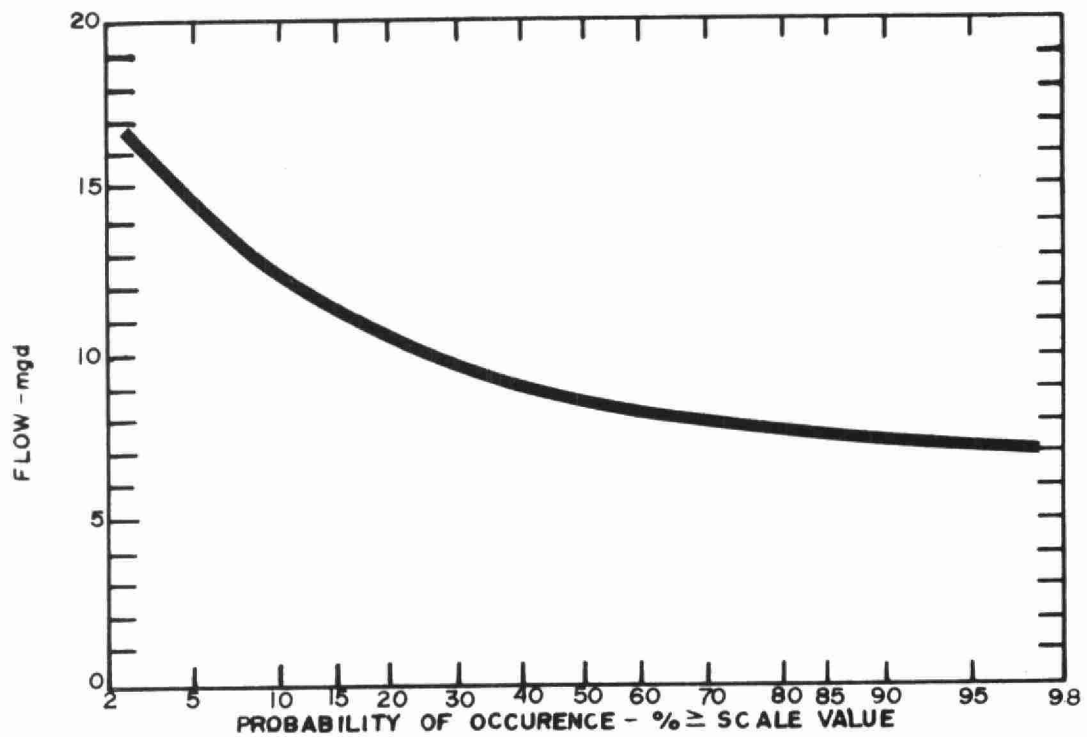
MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED 10 ⁴ lbs.	DOSAGE mg/l
JAN	211.2	6.81	7.32	6.44	0	-
FEB	206.4	7.12	9.89	6.05	0	-
MAR	363.0	11.71	19.54	7.01	0	-
APR	348.8	11.62	18.69	8.89	0	-
MAY	263.7	8.51	11.34	7.60	0	2.4
JUN	227.0	7.57	9.27	6.60	1.24	5.4
JUL	221.3	7.14	10.26	6.06	1.35	6.1
AUG	263.3	8.49	16.69	6.42	1.40	5.3
SEPT	274.4	9.14	12.85	7.07	1.38	5.0
OCT	297.2	9.59	17.47	7.80	1.70	5.7
NOV	262.0	8.73	13.91	7.00	.66	5.8
DEC	257.8	8.31	16.69	7.47	0	-
TOTAL	3196.1	-	-	-	8.37	-
AVERAGE	-	8.70	-	-	1.40	5.4

COMMENTS

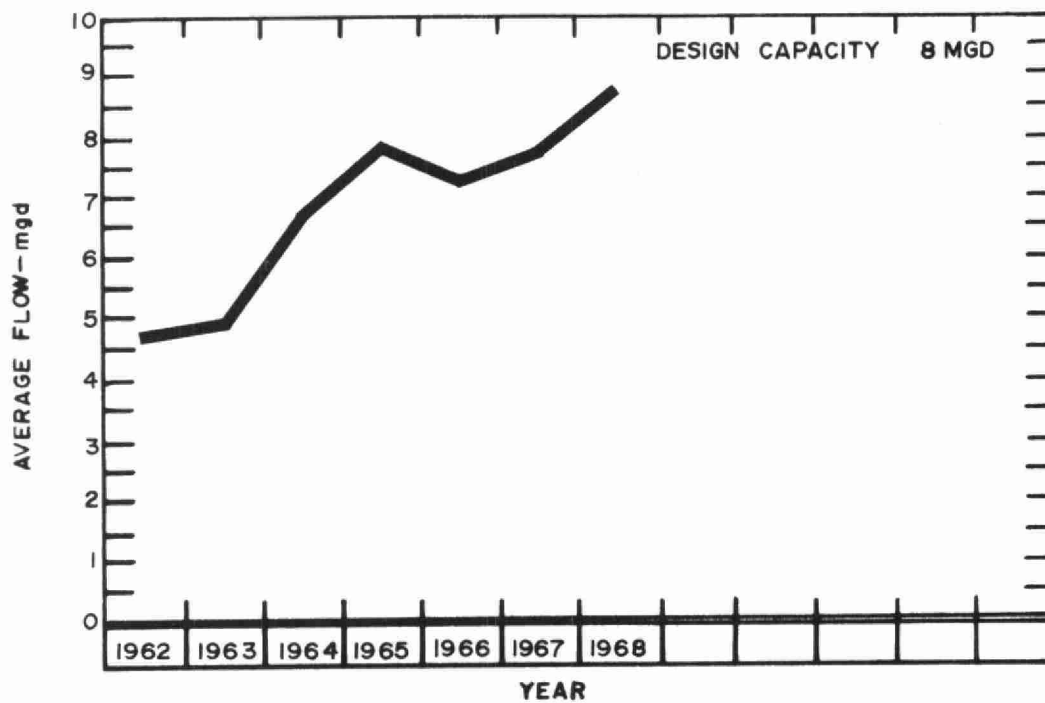
The plant effluent was chlorinated from May through November.

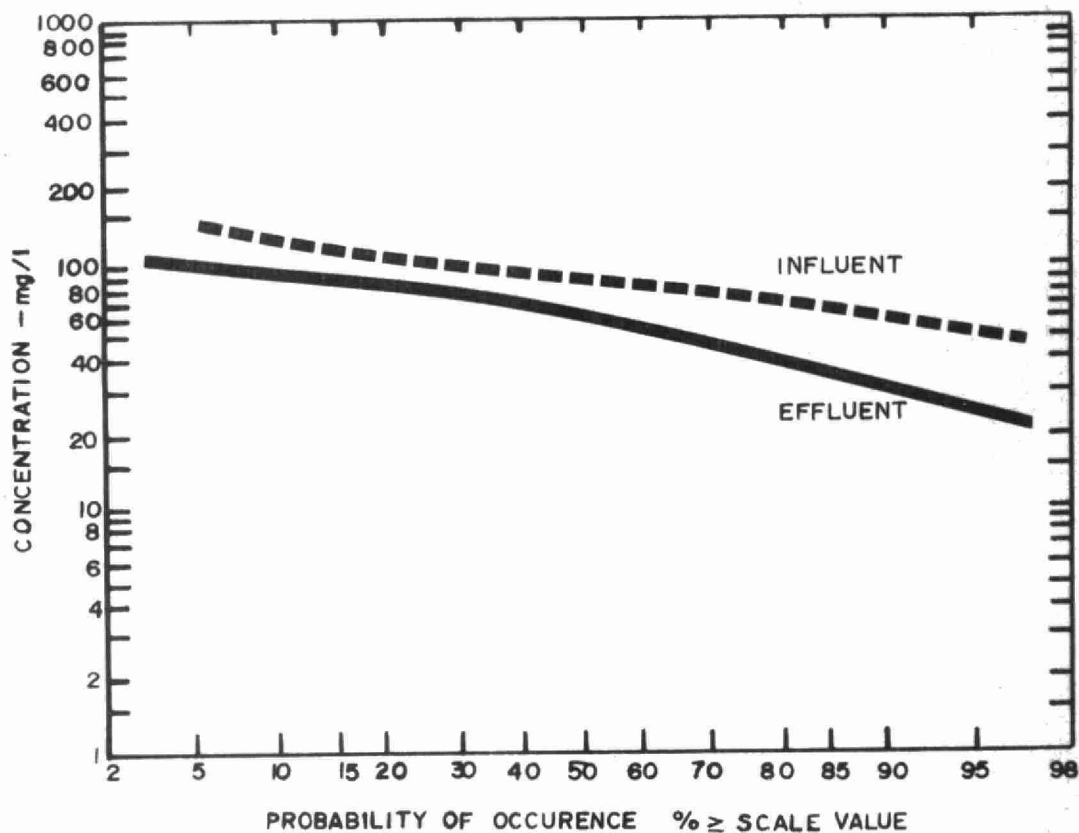
An average of 5.4 mg/l of chlorine was applied to the effluent to maintain a residual of 0.5 mg/l after 15 minutes' contact.

The plant handled a total flow of 3196.1 million gallons in 1968. The probability of occurrence graph indicates that 60% of the time the plant was hydraulically overloaded.

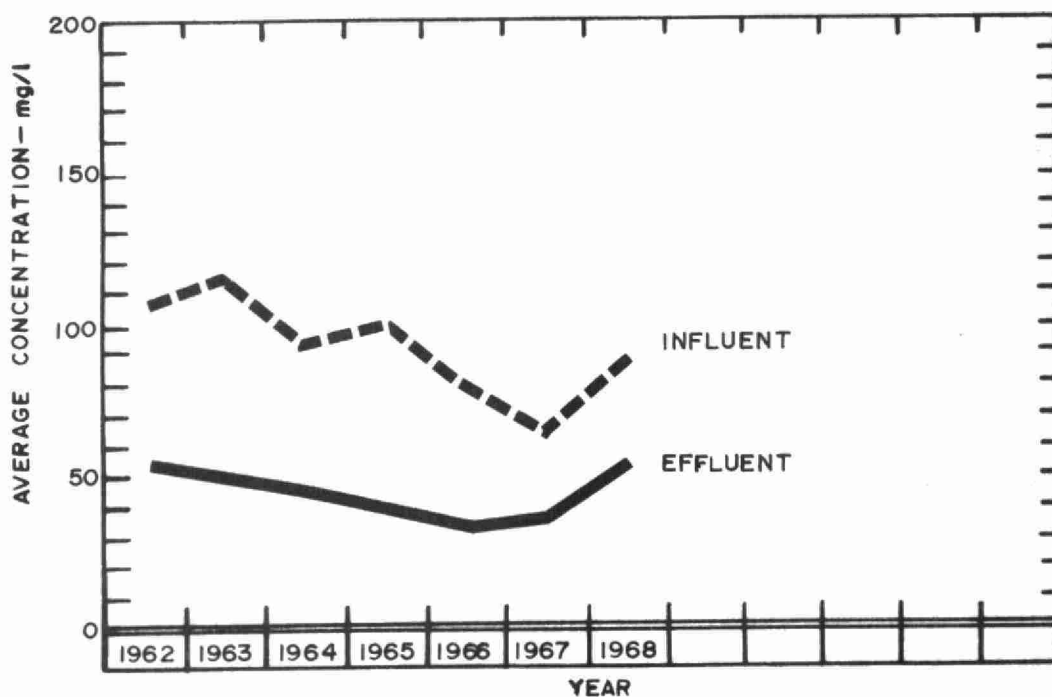


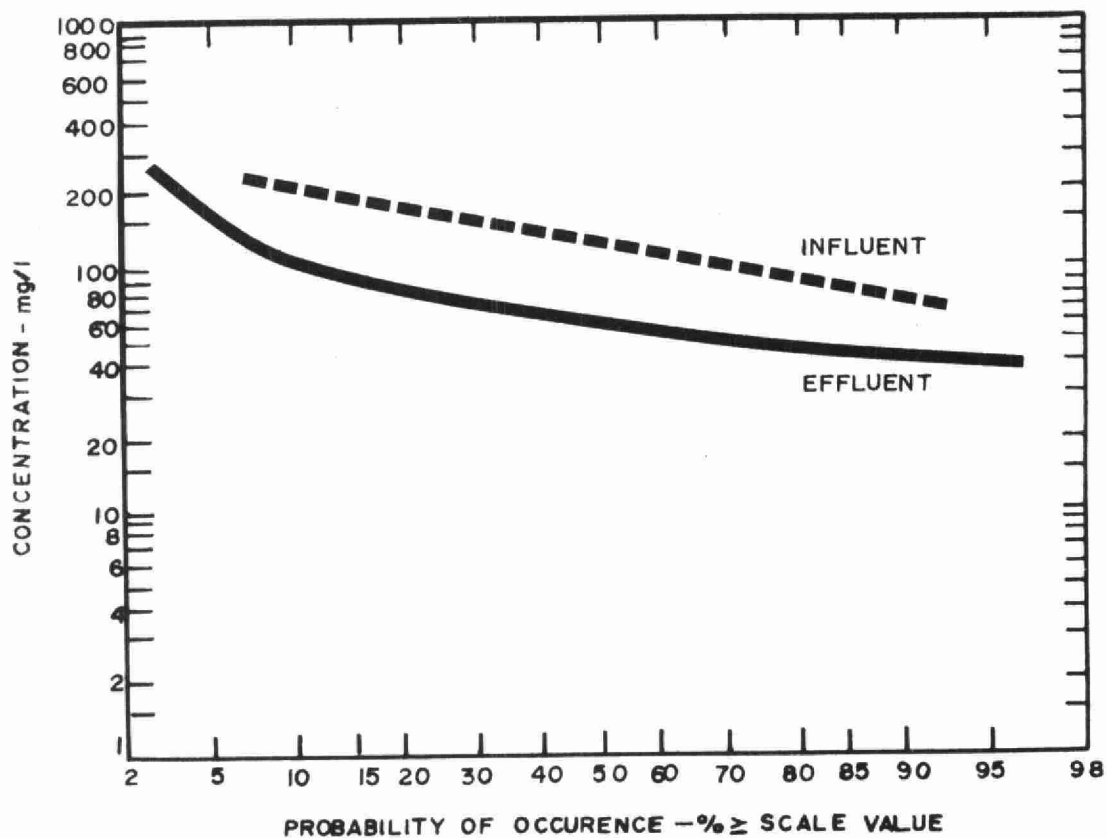
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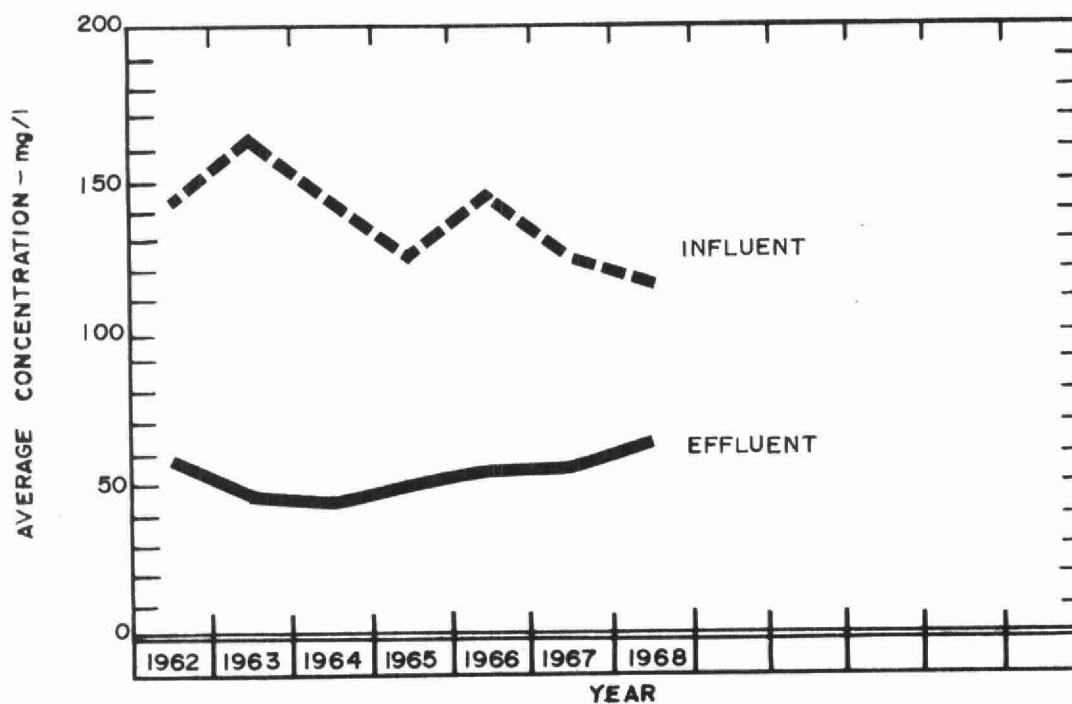


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

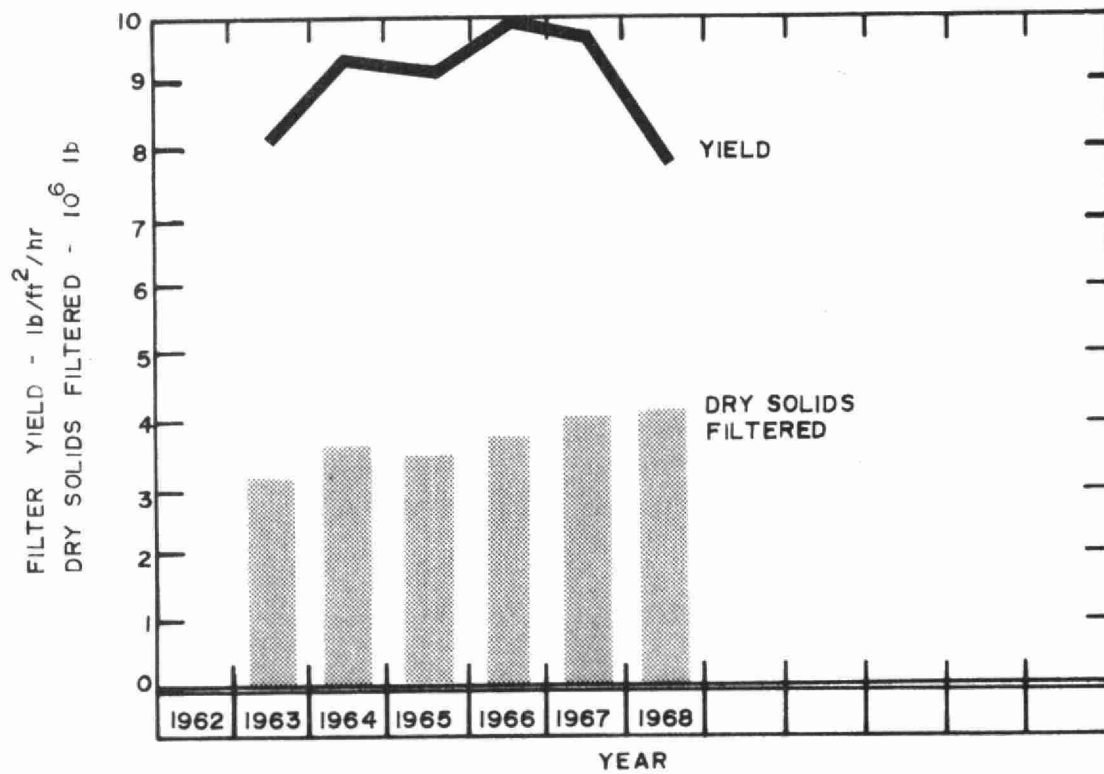
MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC ^N mg/l	EFF CONC ^N mg/l	RED ^N %	REMOVAL 10 ³ lb	INF CONC ^N mg/l	EFF CONC ^N mg/l	RED ^N %	REMOVAL 10 ³ lb	REMOVAL ft ³
JAN	59	42	29	35.9	57	49	14	16.9	172
FEB	98	59	40	80.5	230	52	77	367.3	202
MAR	61	86	-	0	116	127	-	0	522
APR	86	50	42	125.6	123	68	45	191.8	142
MAY	78	54	31	63.3	73	36	51	97.6	485
JUN	104	66	36	86.3	144	71	51	165.7	195
JULY	83	48	42	77.4	88	35	60	117.3	151
AUG	88	47	47	107.9	97	51	47	121.1	98
SEPT	81	48	41	90.5	110	61	45	137.4	185
OCT	69	45	35	71.3	115	105	9	29.7	394
NOV	116	60	48	146.7	111	57	49	141.4	601
DEC	124	68	45	144.4	122	51	58	183.0	207
TOTAL	-	-	-	1029.8	-	-	-	1566.2	3354
AVERAGE	87	56	36	85.5	115	63	45	130.5	280

COMMENTS

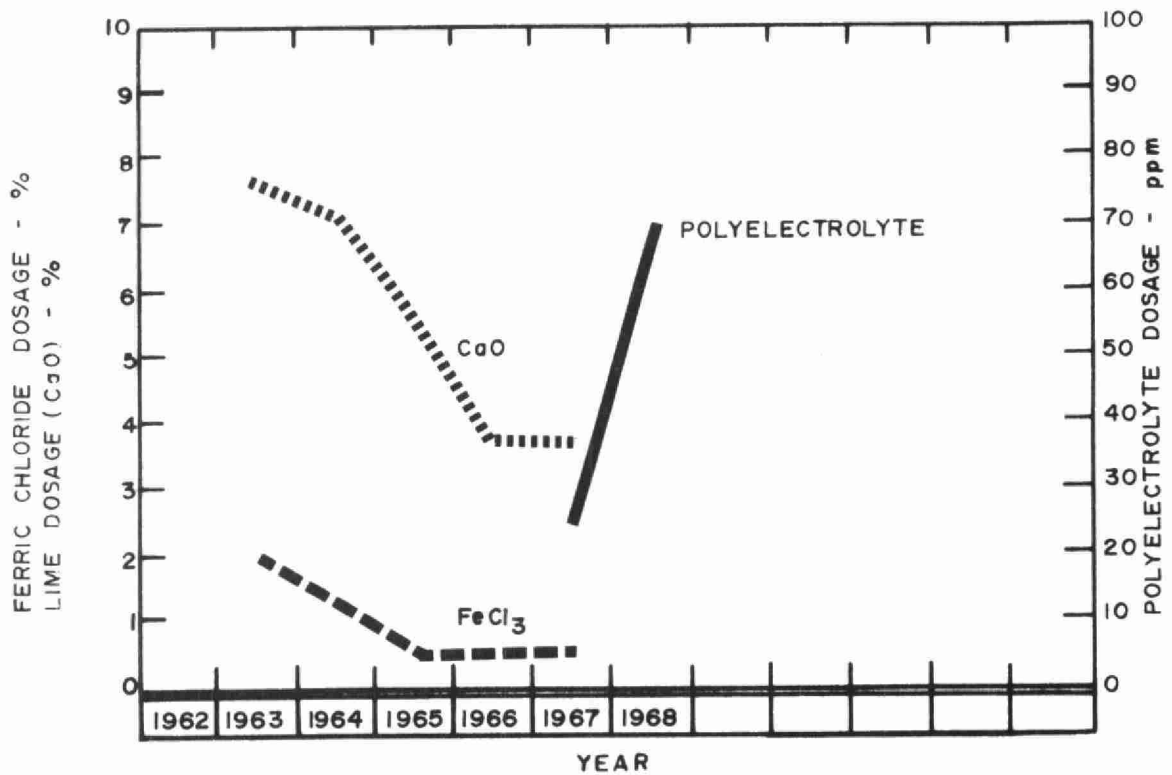
The reduction efficiencies of 36% and 45% of BOD and suspended solids respectively are below the average for primary treatment plants.

The influent BOD and suspended solids concentrations were quite low, indicating a weak sewage.

The low removal percentages can be explained in part by the low strength of the raw sewage and high flows, which result in low retention times.



VACUUM FILTRATION



VACUUM FILTRATION

MONTH	TOTAL FILTER USE hr	SLUDGE TO FILTER		CONDITIONING CHEMICALS						FILT. CAKE	* FILTR	YIELD
		CONC	DRY SOLIDS	Ca O		Fe Cl ₃		POLYMER		T.S. %	T.S. %	lb/ft ² hr
		T.S. %	10 ⁵ lb	lb	%	lb	%	lb	ppm			
JAN	210	4.4	2.77	0	-	0	-	0.7	17	23	0.3	6.7
FEB	218	5.0	3.28	0	-	0	-	0	-	22	0.3	7.5
MAR	188	5.8	3.91	0	-	0	-	1.1	12	24	0.3	8.5
APR	182	5.2	2.79	0	-	0	-	0	-	23	0.3	7.6
MAY	213	5.5	4.30	0	-	0	-	0	-	24	0.4	7.5
JUN	191	5.6	3.06	0	-	0	-	0	-	24	0.5	7.8
JUL	204	6.2	4.15	0	-	0	-	5.7	60	26	0.5	8.1
AUG	226	7.0	4.17	0	-	0	-	14.9	140	25	0.6	9.0
SEP	207	6.5	3.56	0	-	0	-	24.2	120	26	0.6	8.7
OCT	228	6.3	3.48	0	-	0	-	0	-	24	0.6	7.4
NOV	187	5.6	2.94	0	-	0	-	0	-	24	0.6	8.0
DEC	208	5.5	3.45	0	-	0	-	0	-	23	0.5	8.1
TOTAL	2462	-	41.86	-	-	-	-	46.6	-	-	-	-
AVERAGE	205	5.7	3.49	-	-	-	-	-	70**	24	0.5	7.9

* FILTR. DENOTES FILTRATE PLUS WASH WATER

** Dosage when chemicals used

COMMENTS

The 24.0% concentration of filtered sludge was approximately the same as 1967 and is considered good.

Polyelectrolytes were used in the filtering process during the last five months of the year. This has greatly reduced operation and chemical cost.

The yield value for 1968 of 7.9 pounds of dry solids per square foot per hour of operation is very close to design yield.



CONCLUSIONS

The plant is hydraulically overloaded for 67 percent of the time, and four percent of the time plant flows exceed twice the plant capacity. These high flows usually occur in spring and late fall, and they explain the relatively low strength of the raw sewage.

Expansion of the Clark Creek pumping station has effectively eliminated most pumping problems and, as was expected in 1967, increased the hydraulic overloading of the plant. An excessive amount of grease continues to cause operational difficulties. In late 1968 several agents were experimented with to cut this grease.

A program of storm and sanitary sewer separation is scheduled in order to reduce the hydraulic overloading at the plant.

RECOMMENDATIONS

In order to reduce the discharge of grease into the sewers the city must enforce the existing by-laws regarding the control of industrial wastes.

#1



Water management in Ontario